

# GROUND WATER INVESTIGATION

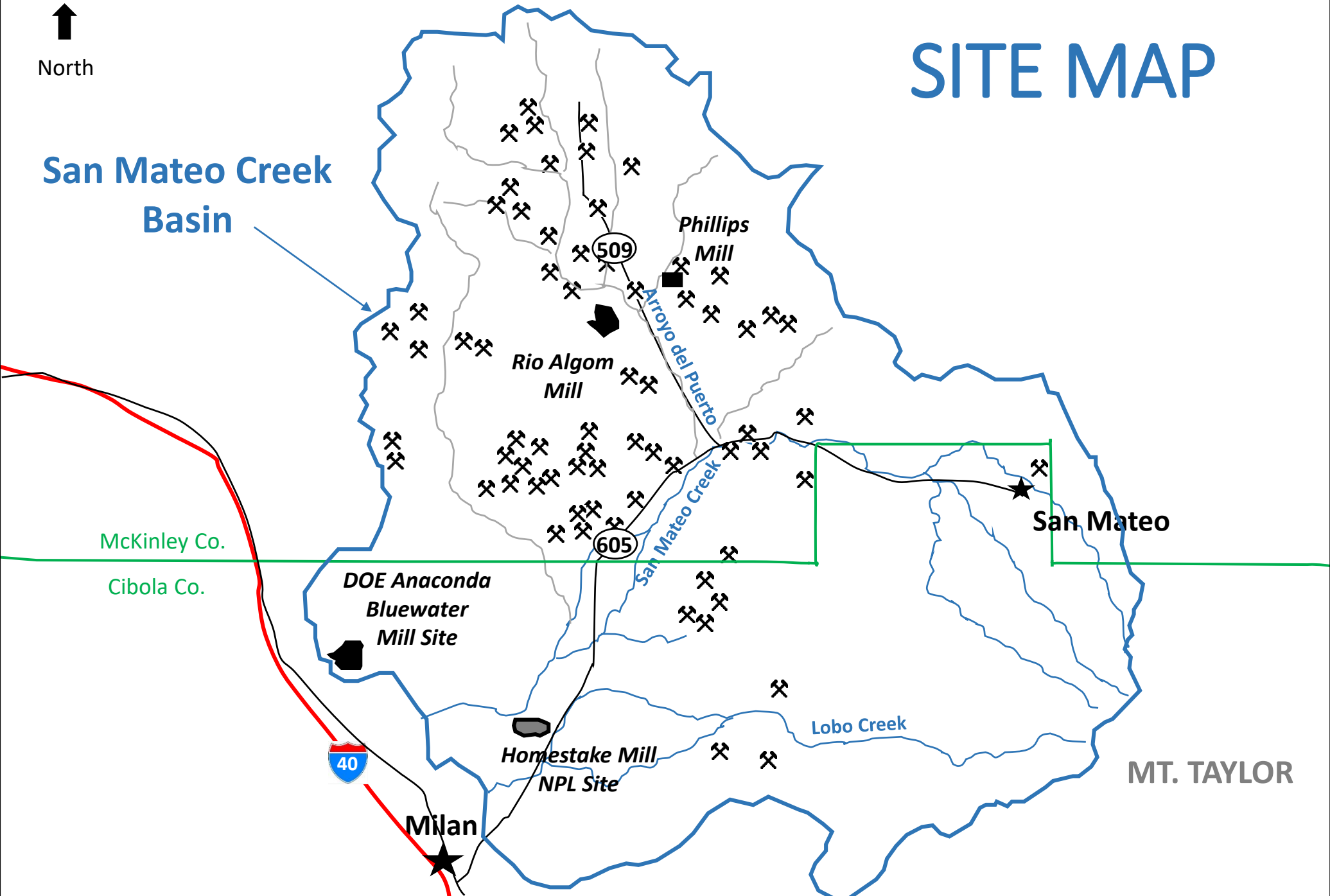
San Mateo Creek Basin Uranium Legacy Site



# SITE MAP

North  
↑

San Mateo Creek  
Basin



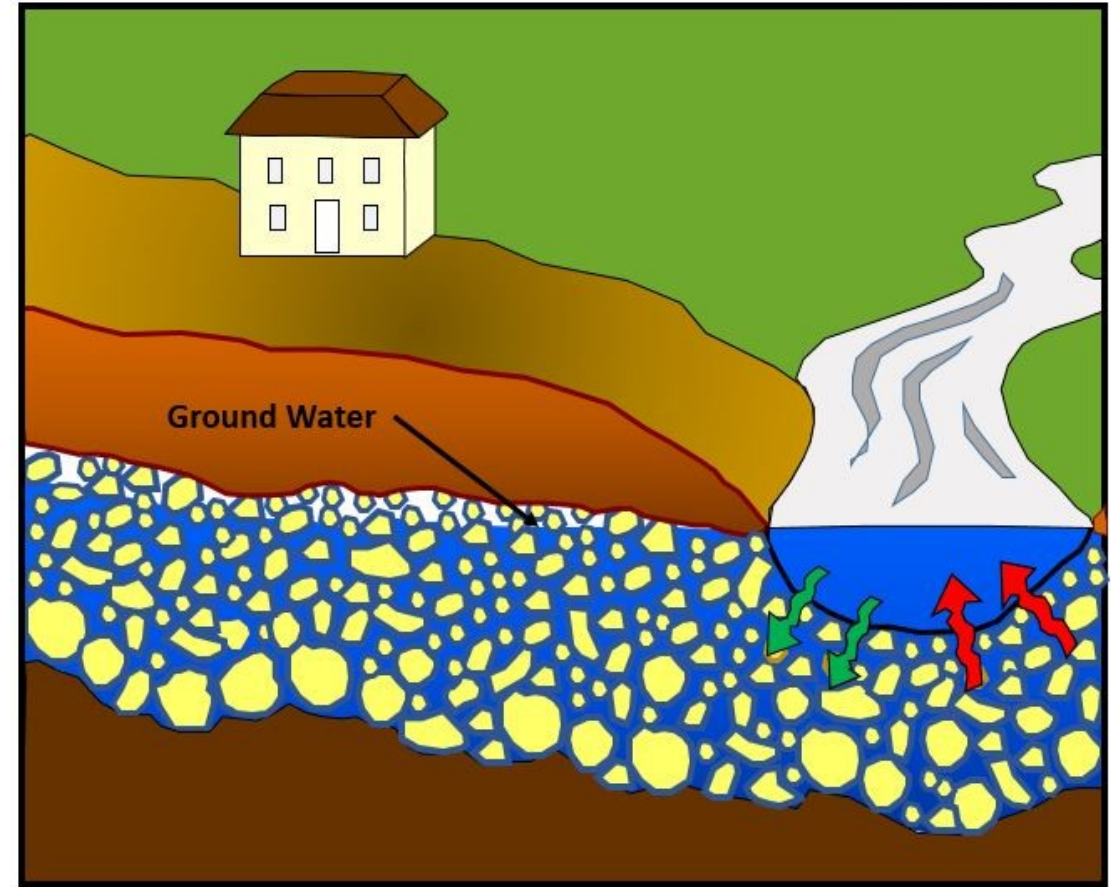
# PROJECT OBJECTIVE

Characterize ground water quality and impact by legacy uranium mining and milling activities



# WHERE IS THE GROUND WATER?

- Alluvial Ground Water
  - Shallow ground water
  - At depths reaching about **120 feet** below ground surface
  - In sediments at base of drainage channels (arroyos, creeks)
- Bedrock Ground Water
  - Deeper ground water
  - Hundreds of feet below ground surface
  - In rock formations

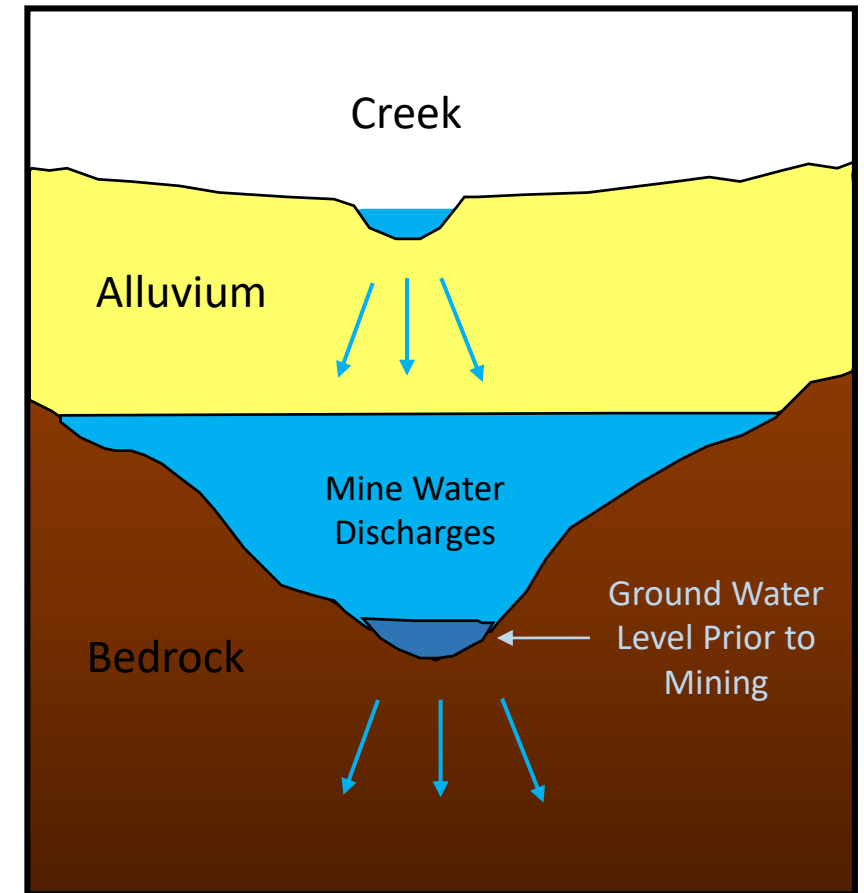


Modified from City of Las Cruces  
Poster Display



# HOW DID MINING OPERATIONS AFFECT GROUND WATER?

- ***Discharged billions of gallons*** of mine water to creeks and arroyos
- ***Water infiltrated*** into ground
- ***Increased amount of ground water*** in alluvial sediments and bedrock
- ***Changed quality*** of ground water



# MINE WATER DISCHARGE

Artificially  
Created Flows in  
Arroyos



# MULTI-PHASED INVESTIGATION

## *Phase 1*

*Shallow Alluvial Aquifer  
2012 – 2016  
(Completed)*

## *Phase 2*

*Bedrock & Alluvial Aquifers  
2015 – 2017*

## *Phase 3*

*Develop Conceptual Site  
Ground Water Model  
2016 - 2018*



Wet Alluvial Sediments



Bedrock Sandstone



Drill Bit and Piping

# PHASE 1 ACTIVITIES COMPLETED

- 30 Boreholes Drilled
  - 6 monitoring wells installed where water encountered
  - 24 boreholes dry
- 15 Existing Wells Sampled
  - 10 private wells
  - 5 industry monitoring wells
  - Includes both alluvial and bedrock wells



Core Sample

# PHASE 1 RESULTS SUMMARY

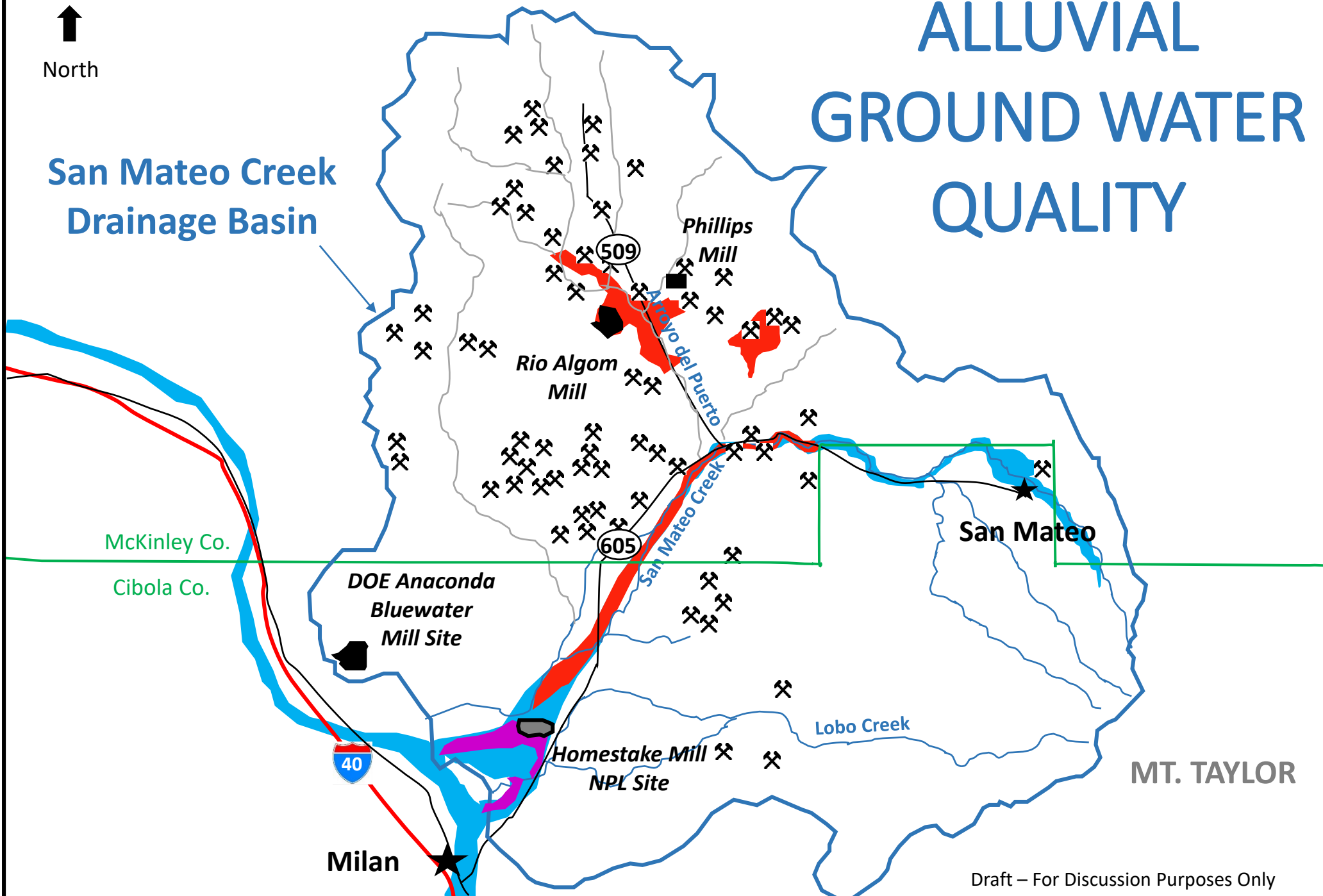
- Attempt to Characterize Alluvial Water Quality had **Mixed Results**
  - Lack of Natural Saturation in Many Areas Investigated
- Alluvial **Water Quality Varies** Across Basin
  - Good quality upgradient of mines and mills
  - Poor quality downgradient of mines and mills
- Mine Discharge Water **Increased Saturation** in Alluvium
- Mine Discharge **Water Draining Out** of Alluvium Today



# ALLUVIAL GROUND WATER QUALITY



North

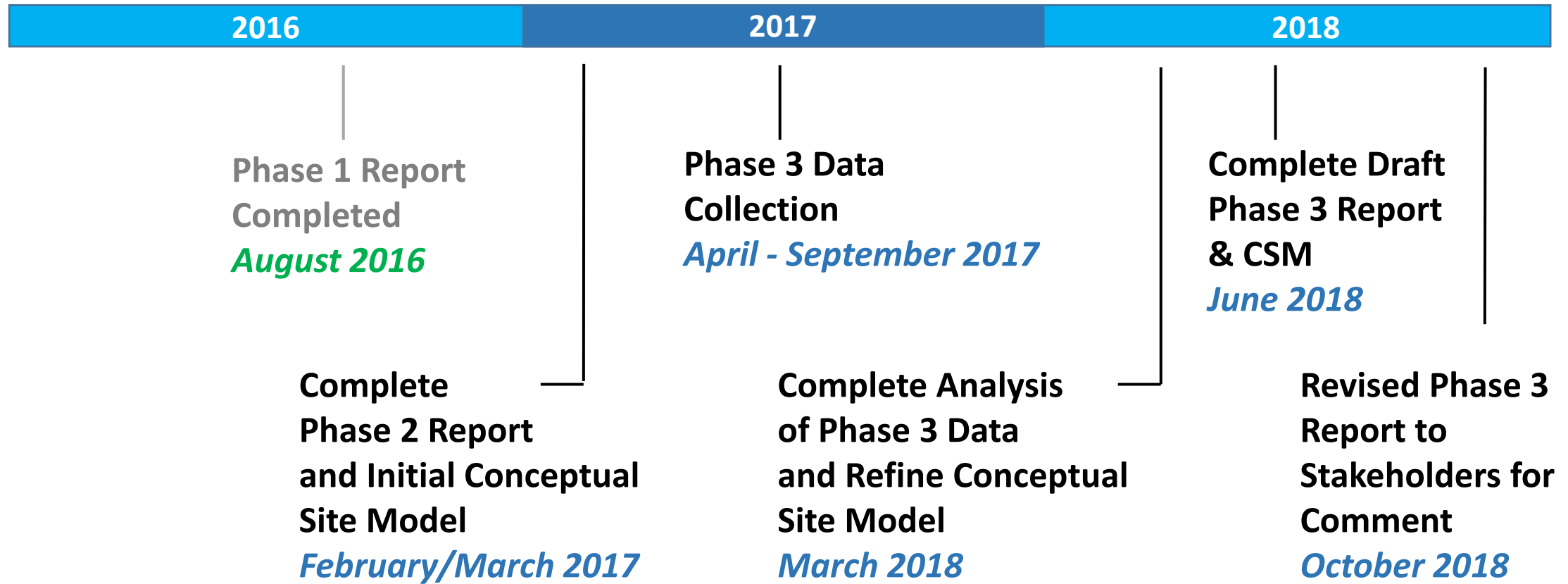
San Mateo Creek  
Drainage Basin



-  Alluvial Ground Water
-  Poor Alluvial Water Quality (Exceeds Standards)
-  Poor Alluvial Water Quality Contaminated by Homestake NPL site (Exceeds Standards)

Draft – For Discussion Purposes Only

# PLANNED ACTIVITIES FOR GROUND WATER INVESTIGATION



# Other Slides

**A**

# CROSS SECTION A-A'

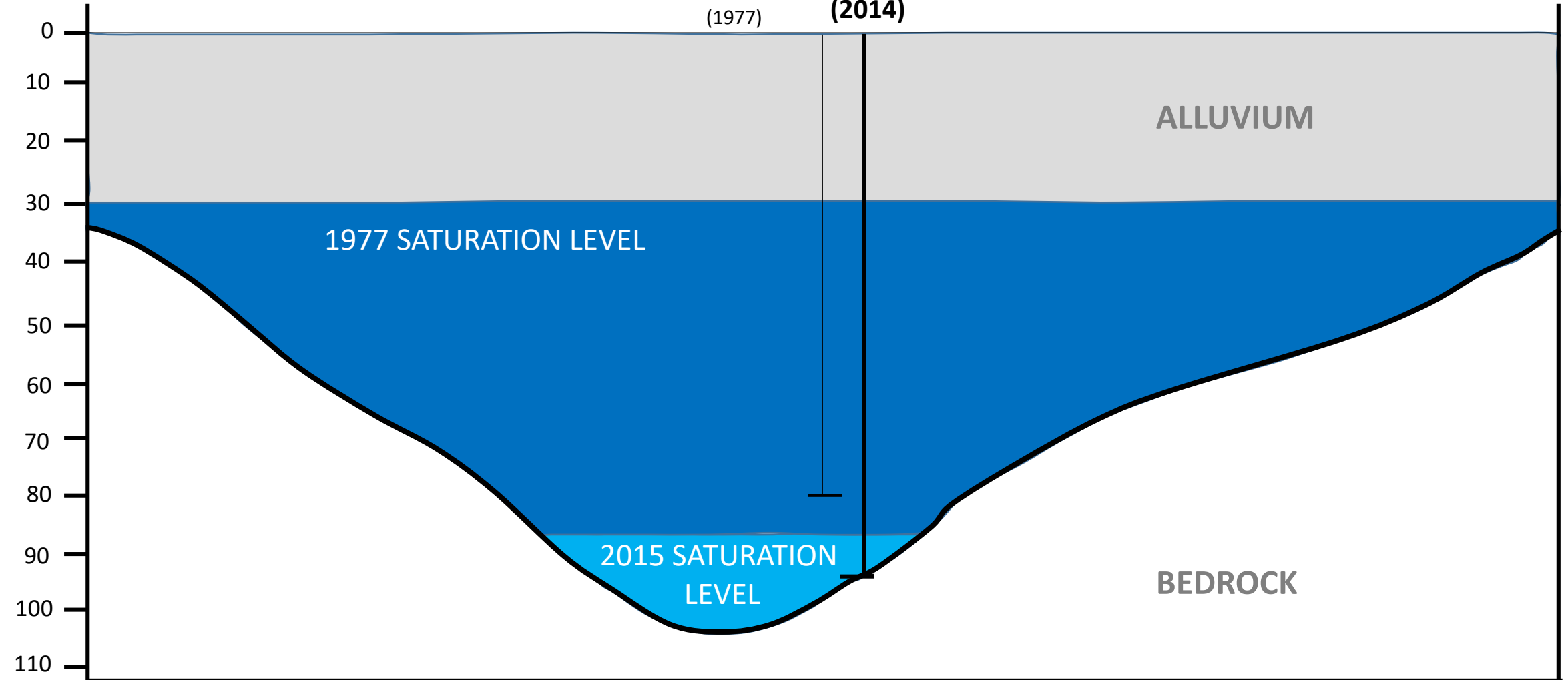
## CENTRAL SAN MATEO CREEK BASIN AREA

**A'**

West

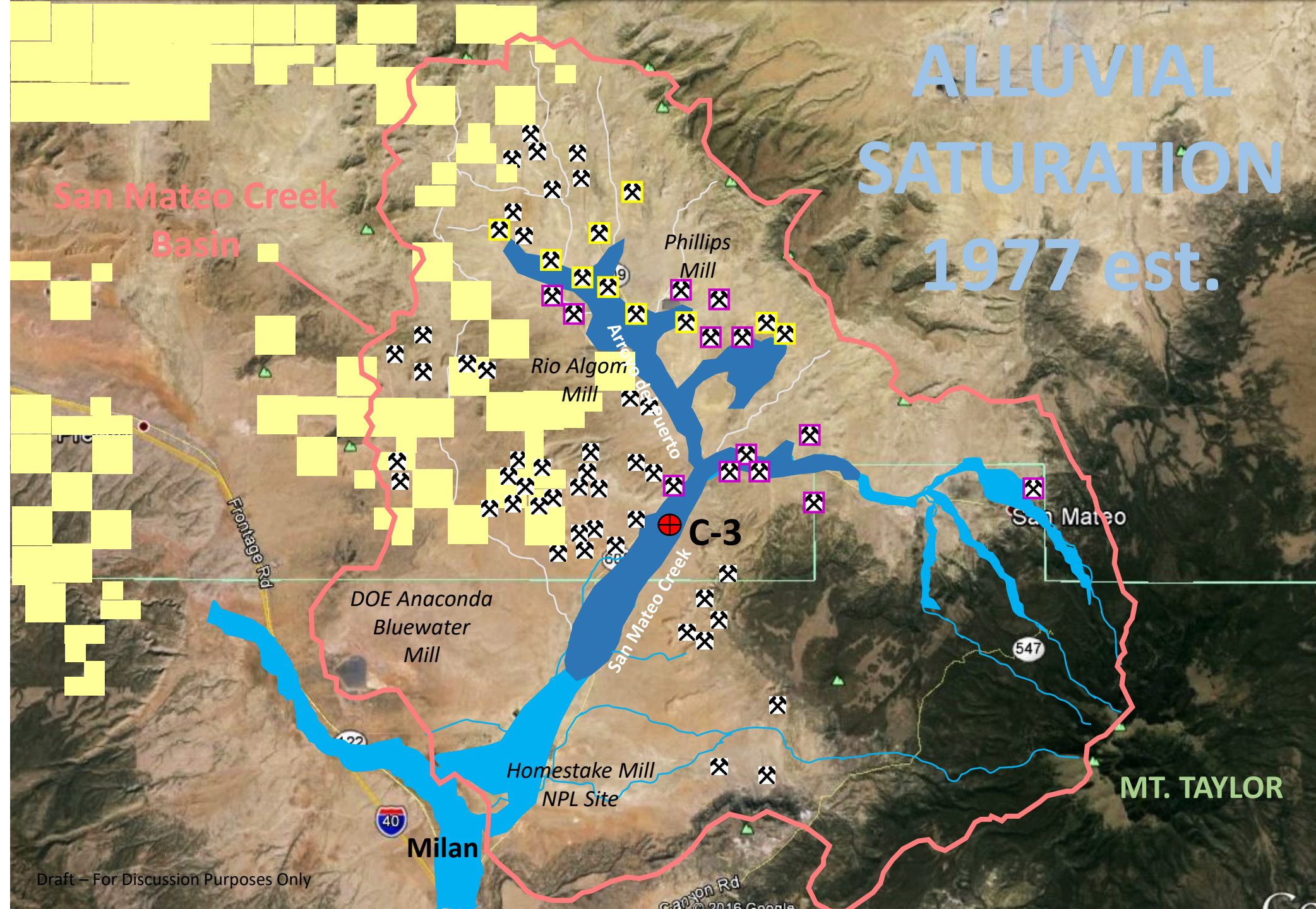
East

Depth  
(ft)

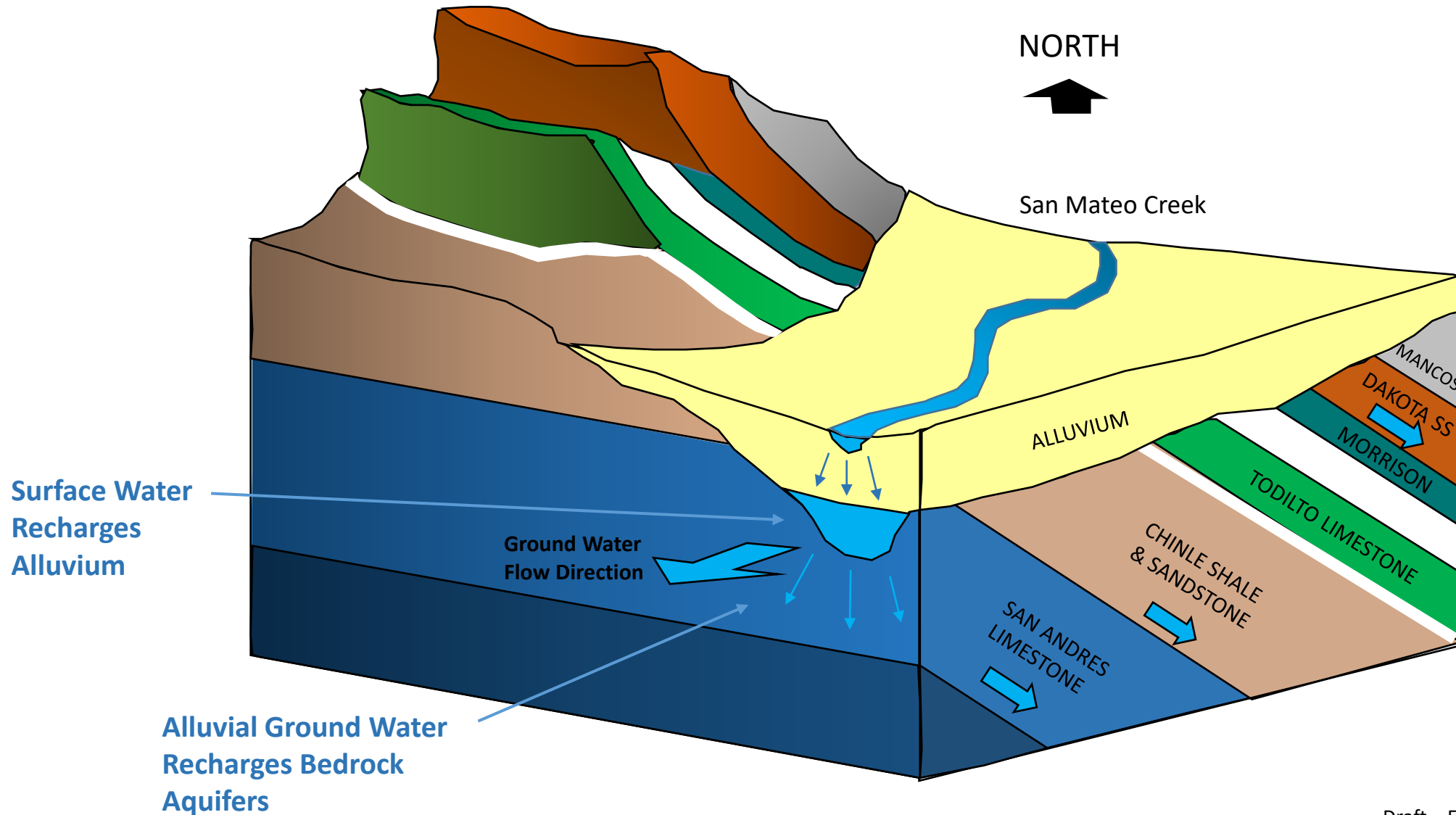


# ALLUVIAL SATURATION 1977 est.

San Mateo Creek  
Basin

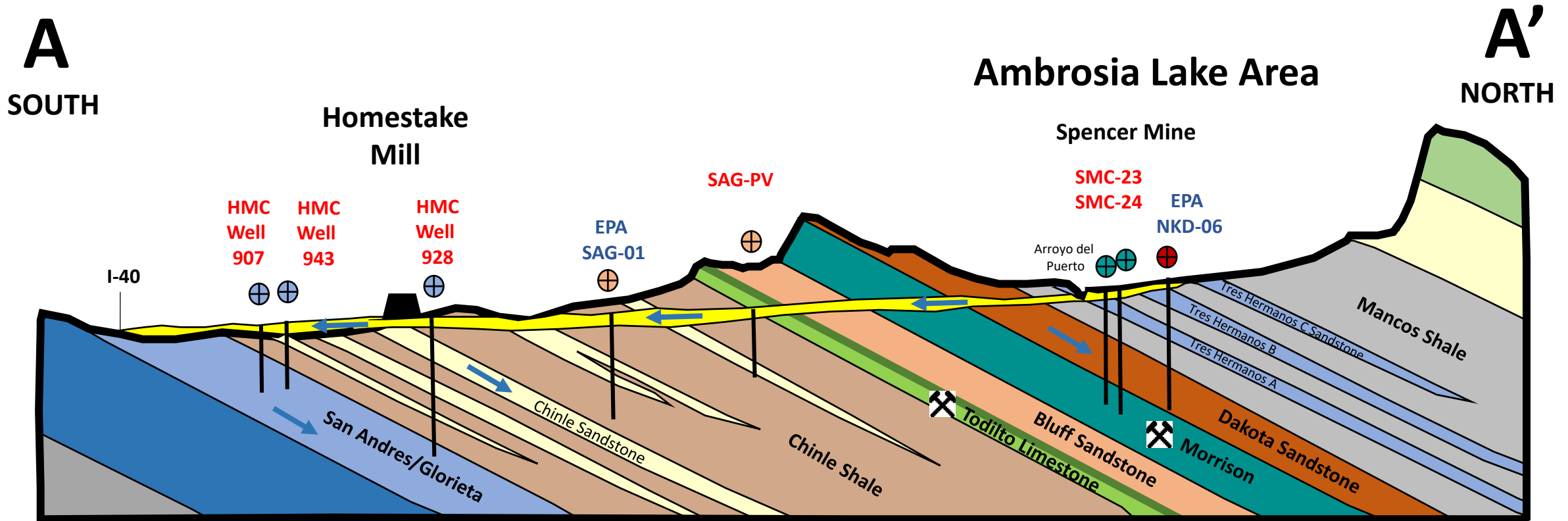


# CONCEPTUAL SITE GROUND WATER MODEL



# CONCEPTUAL SITE GROUND WATER MODEL

## Generalized Cross Section Through San Mateo Creek Basin



5 Miles

# ALLUVIAL WATER QUALITY MAP

San Mateo Creek  
Basin

39

10,000

Phillips  
Mill

Rio Algom  
Mill

Arroyo d

3,600

46

4,600

250

1,100

310

350

16

4

3

610

110

2,200

DOE Anaconda  
Bluewater  
Mill Site



Homestake Mill  
NPL Site

San Mateo



547

Uranium  
Total Dissolved  
Solids

Draft – For Discussion Purposes Only

-  EPA Background Well
-  Well Downgradient to Legacy Mines

- 16** Uranium (ppb)
- 16** Total Dissolved Solids (ppm)

-  Alluvial Water
-  Mine Water Discharge

MT. TAYLOR

Canyon Rd  
© 2016 Google

# PHASE 1 WELL SAMPLING LOCATIONS

North  
↑

San Mateo Creek  
Basin

McKinley Co.

Cibola Co.

DOE Anaconda  
Bluewater  
Mill Site

Homestake Mill  
NPL Site

Milan

Phillips  
Mill





Rio Algom  
Mill

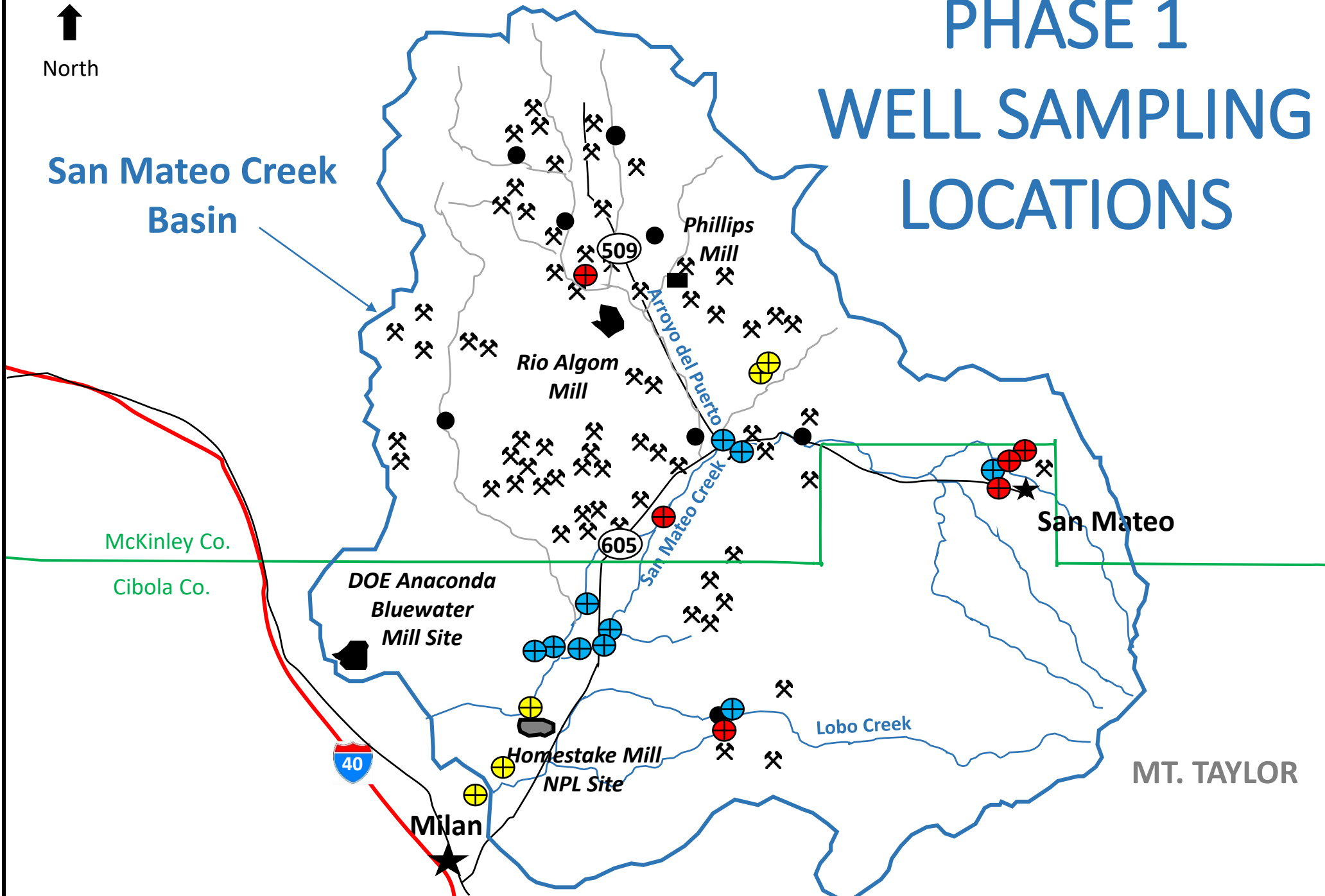
Aroyo del Puerto  
San Mateo Creek

Lobo Creek

San Mateo

MT. TAYLOR

-  EPA Alluvial  
Monitoring Well
-  Industry  
Monitoring  
Well
-  Private Well
-  Dry Borehole



# RESULTS OF PRIVATE WELL SAMPLING

- All 10 private wells exceeded standards
- Only 3 of 10 wells used for drinking water supply
- Only 1 of the 3 exceeded drinking water standards
- Point-of-Use Treatment Systems installed by EPA at home exceeding standards